MASTER

(AM33)

See Also Heaps, J.M. "The duration of surface wetness", Met. Mag. 90, 174-178

2.15.11

33

The Duration of Surface Wetness

1. Introduction.

A paper entitled "The Duration of Surface Wetness (a new approach to Horticultural Climatology)" was presented at the XVth International Horticultural Congress in 1958. The present memorandum contains parts of that paper, which still awaits publication.

2. The surface wetness recorder.

Liaison between plant pathologists at Rothamsted and members of the Meteorological Office at Harrow has resulted in the production of a new instrument called a surface wetness recorder. This instrument, which is similar to a dew balance, records the length of time an artificial polystyrene block retains any surface moisture when exposed in the open air. A full deflection on the instrument is approximately equivalent to a heavy dewfall or the minimum rainfall observed in a rain-gauge.

During the summer of 1957 one of these instruments was exposed in an orchard at Sudbury, Suffolk. The nearest meteorological station taking hourly observations of humidity is at Felixstowe, some 20 miles away to the E.S.E., on the Suffolk coast. The hours of surface wetness at Sudbury were compared with the number of hours with a relative humidity of 90% or more at Felixstowe, with the following results:-

Period of 10 days ending	10-day means of duration (in hours) of (a) Surface Wetness	(b) High Humidity
March 28	11.3	10.7
April 7	8.1	10.9
April 17	4.7	3.8
April 27	1.7	1.1
May 7	3.3	2.8
May 17	6.0	4.0
May 27	4.2	4.0
June 6	3.7	2.8
June 16	6.2	4.5
June 26	5.7	3.8
July 6	5.9	7.0
July 16	6.2	4.5
July 27	7.6	7.2

(Record for July 18 missing)

The correlation coefficient between these two sets of figures is 0.90, which is extremely high when it is remembered that the two stations are 20 miles apart and that one is inland and the other on the coast. If the records are examined in more detail it becomes evident that there were 6 days when coastal fog prevailed at Felixstowe and not at Sudbury (April 1-5 and July 5) and 6 other days when showers fell inland but not on the coast (April 10, June 8, 12 and 26th, July 1st and 10th).

If these dissimilar days are eliminated, the coefficient becomes 0.97 and the close similarity between the records is illustrated by the running 10-day means plotted in Figure 1.

3. Operational Use

It is therefore suggested that humidity observations from a network of meteorological stations would provide an operational picture of potential disease incidence over the country which would be of similar accuracy to the picture obtained from a network of surface-wetness recorders. (This is, in fact, being investigated in 1960).

4. Climatological Use.

Climatological maps showing the average duration of high humidities will obviously give a very good representation of the average duration of surface wetness. Figure 2 shows the average map for June and July. The areas with the least number of hours of high humidity are not those with the lowest average humidity or those with the lowest daytime humidities.

The area with the least number of humid hours lies in the Wirral of Cheshire and south-west Lancashire in the 'shadow' of the Welsh mountains. A similar area exists behind the Pennines. Other factors which affect the parameter are

(a) height above sea level
(b) nearness to the sea
(c) local topography and liability to frost or fog.

In confirmation of the existence of a non-humid area in north-west England, it is interesting to note that barn hay drying has been unusually successful in the lowlands of Lancashire and Cheshire. It is also an area of relatively high potential transpiration.

L. P. Smith.

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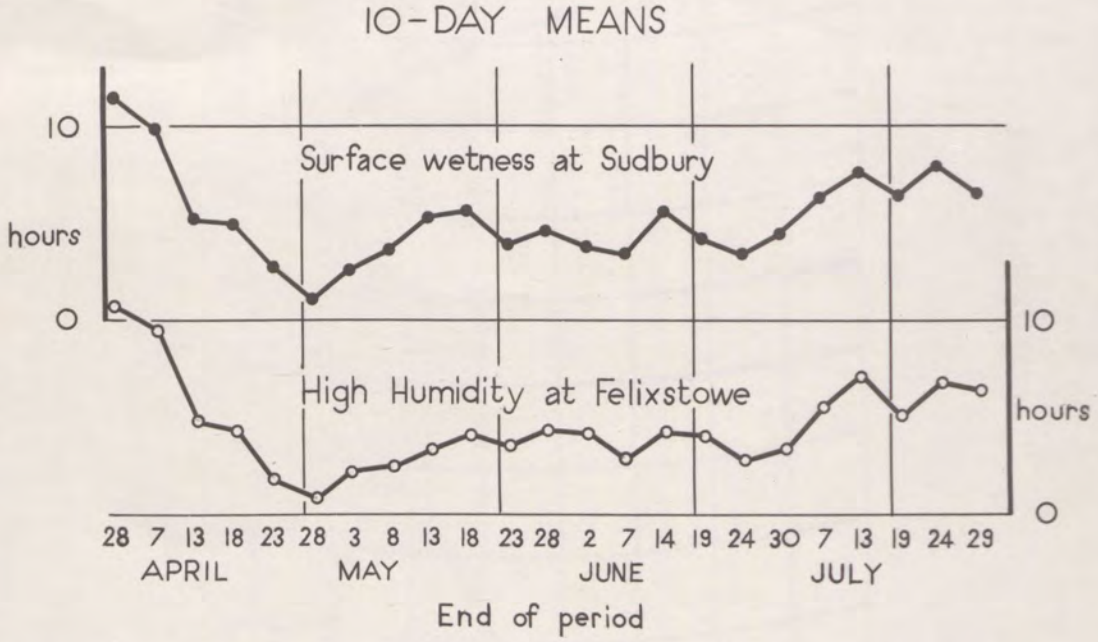
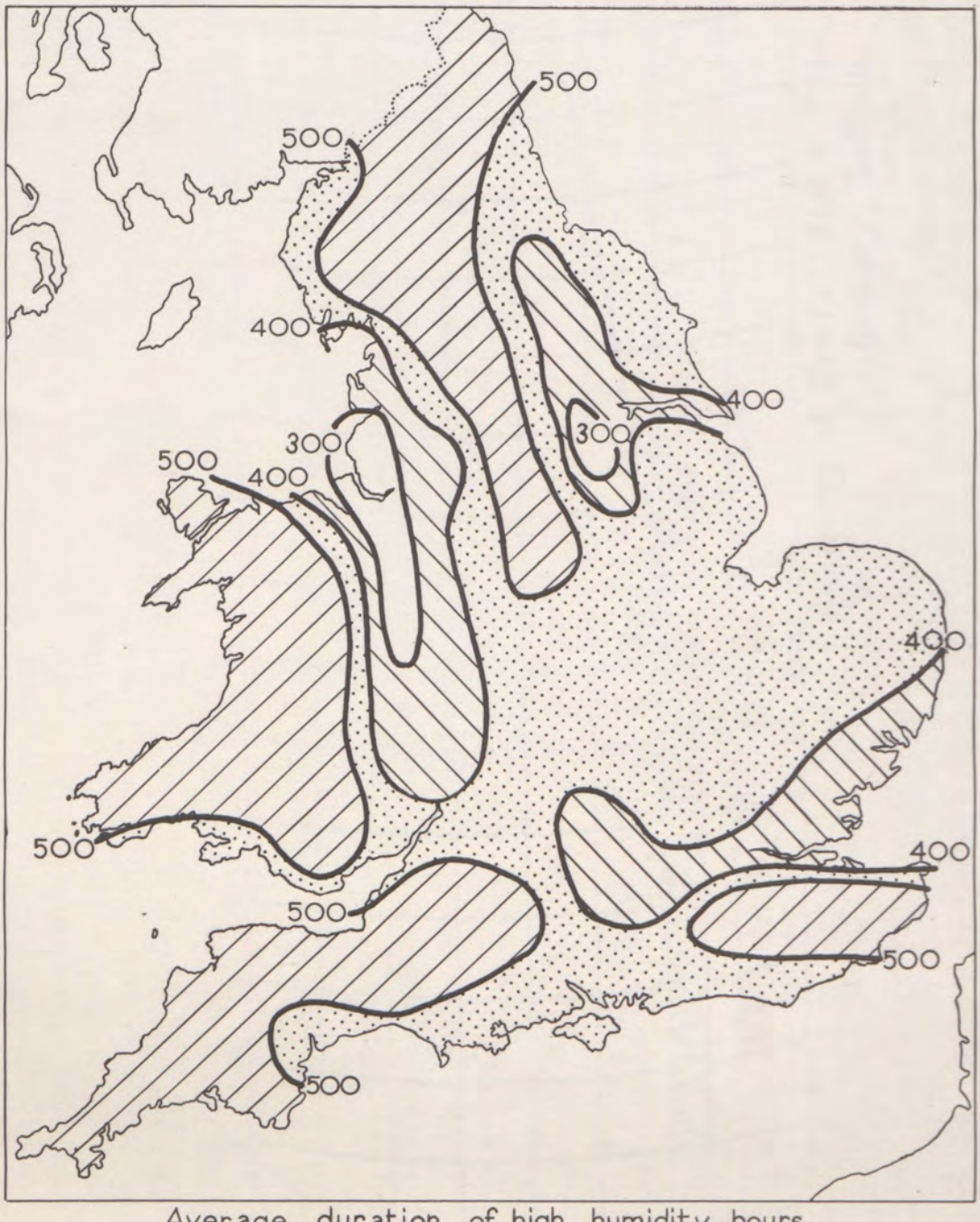
M.O.3a, Harrow.
October 1960.

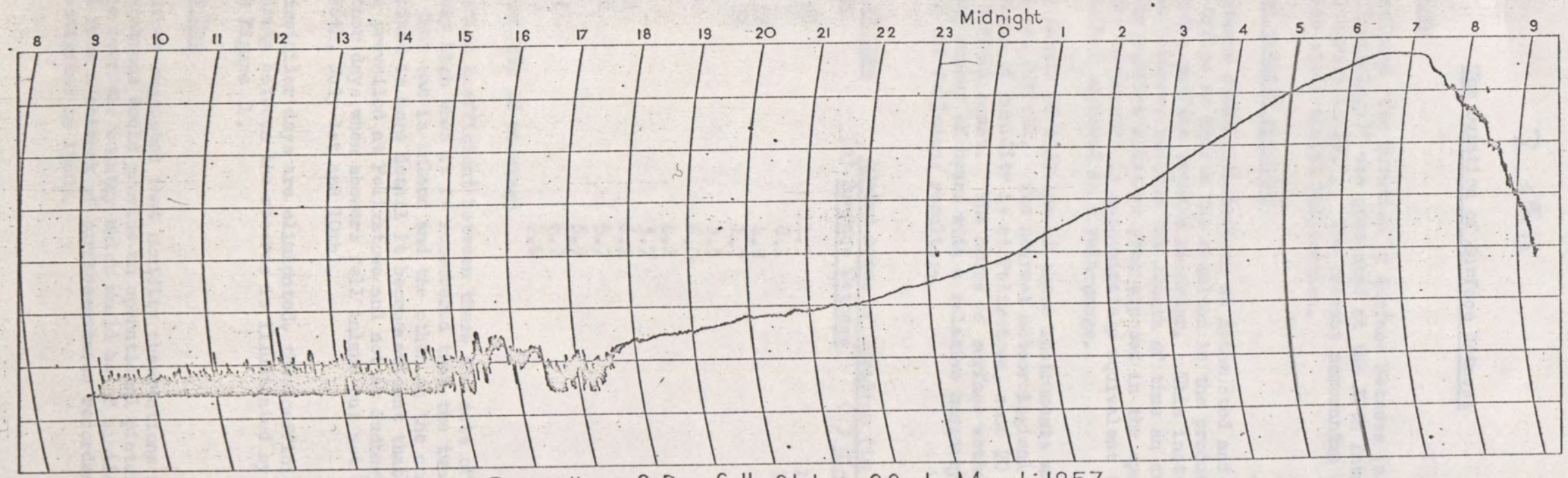
G.1645/DEW/11/60/60



Comparison of High Humidity hours with Surface-Wetness hours



Average duration of high humidity hours during June and July. (1950–1954)



Recording of Dewfall 21st. & 22nd. March 1957.
Sudbury, Suffolk.